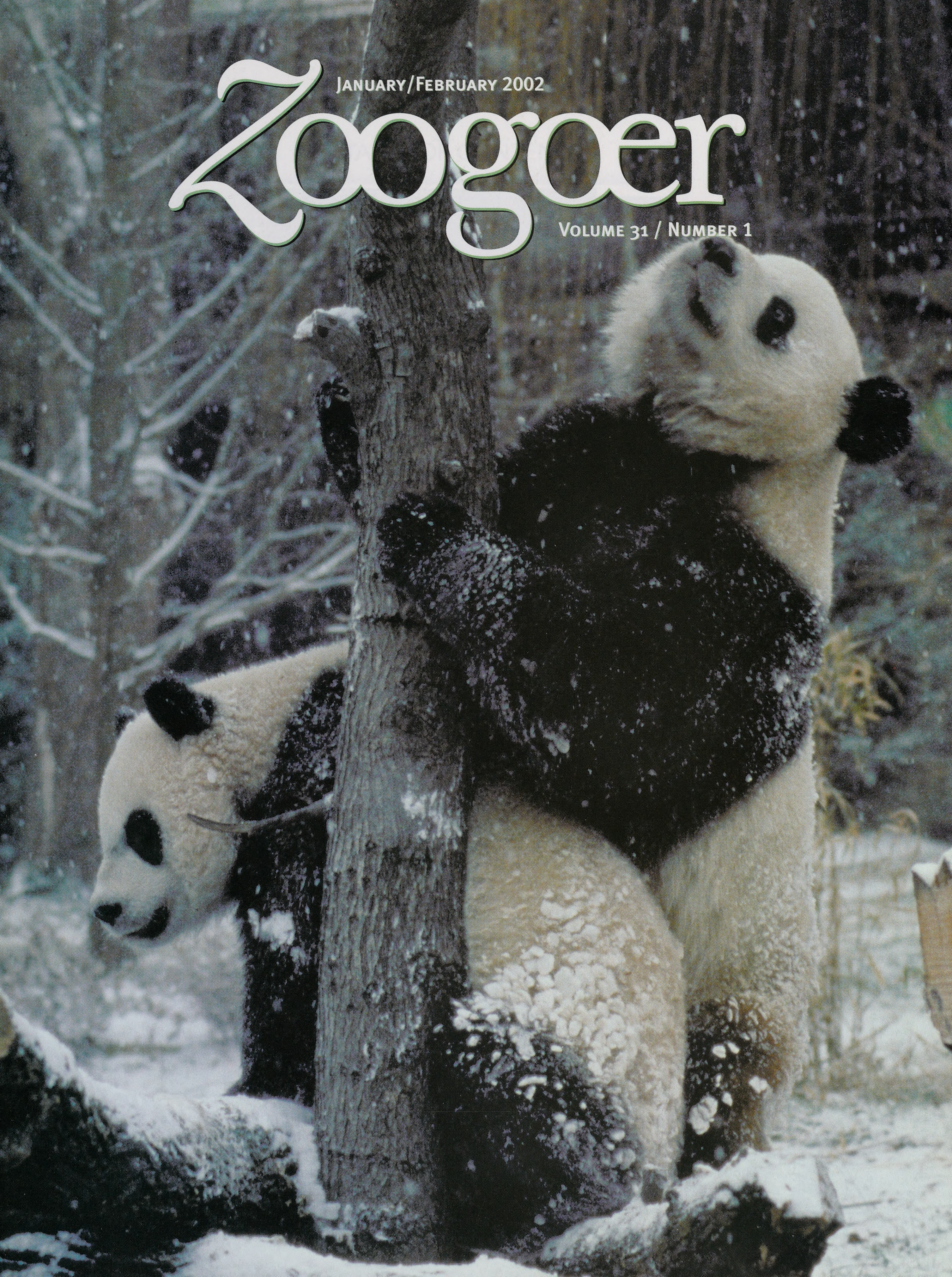


JANUARY/FEBRUARY 2002

Zoogoer

VOLUME 31 / NUMBER 1





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In an effort to secure their future in China and North America, Fujifilm is proud to sponsor the future home of two giant pandas at the Smithsonian's National Zoo. Two-and-a-half year old Mei Xiang and three-and-a-half year old Tian Tian will be housed in a state-of-the-art facility under the care of the National Zoo. Fujifilm recognizes that although photography is wonderful for preserving memories, it can never replace the real thing. www.fujifilm.com



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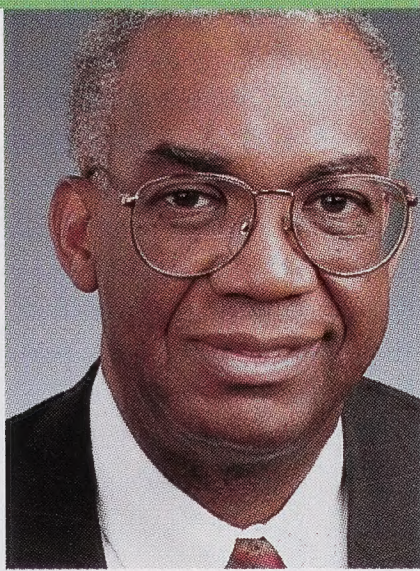
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REALLY BIG NEWS

We heard the great news just as this issue of *ZooGoer* was going to press: A male Asian elephant calf was born on Sunday, November 25, at 2:35 in the afternoon. Both the calf, which weighed in at a whopping 325 pounds, and mother Shanthi are doing fine. The birth came a little sooner than expected—the ETA

had been mid-December—but some variation in gestation time is normal for elephants, as it is for many mammals, including people.

The birth of this calf, who has been named Kandula, represents a remarkable achievement. Shanthi's pregnancy was only the fourth successful artificial insemination of an elephant in the United States and the fifth in the world. Smithsonian National Zoo scientists and their collaborators from around the world worked for several years to make this happen, a wonderful example of international cooperation among zoos and scientists interested in increasing the number of elephants in zoos. In the process of working to perfect the artificial insemination techniques, they gained new insights into elephant reproductive biology that will help improve elephant breeding in zoos in the future.

A less visible but no less important advance in promoting elephant breeding in zoos also occurred recently at the National Zoo. You may remember that Shanthi's first calf, Kumari, died of a mysterious disease when she was 16 months old. In investigating the disease, Zoo scientists discovered that many young elephants had died of this disease, which they identified as a previously unknown herpes virus. As a result of their work, methods have been developed to diagnose and effectively treat this deadly infection of elephants.

Most amazing for me was to watch the Zoo's elephant keepers' interactions with Shanthi around the time of birth. Midwifing a birth when the mother weighs several tons is no small task. But the deep rapport between the keepers and the elephant was abundantly evident, and this enabled them and the Zoo's veterinarians to stay close to monitor the delivery and the calf's crucial first hours.

Feisty and rambunctious, Kandula is already a handful for his keepers. As he matures, he will be even more of a challenge to manage. This is one reason we turned to artificial insemination to breed Shanthi. Bigger and bolder than females, adult male elephants require far stronger facilities to be safely maintained in zoos. Like those of most zoos, our current elephant facilities are not secure enough for bulls. We plan, however, to change this by the time Kandula grows up.

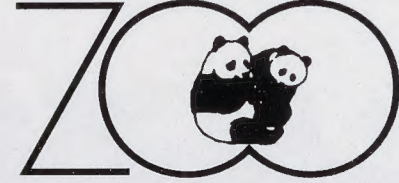
A key component of Zoo Director Lucy Spelman's vision for the future of the National Zoo (see page 8) is a new habitat and facility for Asian elephants on the planned Asia Trail. Not only will we create a much larger space than the Zoo's three female elephants have now, but we intend to build a facility where we can exhibit adult male elephants along with a multi-generation herd of females.

These are certainly exciting times at the National Zoo, with new babies, new exhibits, and new conservation and research initiatives. Most of these projects would not be possible without the support of our generous FONZ members and a growing roster of foundations and corporations that believe in and support the Zoo's work. Everyone who contributes to the Zoo can look at this young elephant and beam like a proud parent. What a wonderful reward for supporting a wonderful cause!

Sincerely,

Clinton A. Fields
Executive Director

Friends of the National



is a nonprofit organization of individuals, families, and organizations who are interested in helping to maintain the status of the Smithsonian National Zoological Park as one of the world's great

zoos, to foster its use for education, research, and recreation, to increase and improve its facilities and collections, and to advance the welfare of its animals.

ZooGoer [ISSN 0163-416X] is published bimonthly by Friends of the National Zoo (offices located at the Smithsonian National Zoological Park, 3001 Connecticut Ave., N.W., Washington, DC 20008-2537) to promote its aims and programs, and to provide information about FONZ activities to its members, volunteers, and others interested in the purposes of FONZ. Periodicals postage paid at Washington, D.C. Postmaster: Send change of address to *ZooGoer*, 3001 Connecticut Ave. NW, Washington, DC 20008-2537. Copyright 2002. All rights reserved.

Smithsonian *National Zoological Park* is located at 3001 Connecticut Ave., N.W., Washington, DC 20008-2537. Weather permitting, the Zoo is open every day except December 25. Hours: From May 1 to September 15, grounds are open from 6 a.m. to 8 p.m.; buildings, 10 a.m. to 6 p.m. From September 16 to April 30, grounds are open from 6 a.m. to 6 p.m.; buildings, 10 a.m. to 4:30 p.m.

Membership in FONZ offers many benefits: publications, discounts on shopping, programs, and events, free parking, and invitations to special programs and activities to make zoogoing more enjoyable and educational. To join, write FONZ Membership, National Zoological Park, Washington, DC 20008, call 202.673.4961 or go to www.fonz.org.

Membership categories and annual tax-deductible dues are:

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Cover photo: Mei and Tian cavort in the snow.
Photo by Jessie Cohen/NZP.

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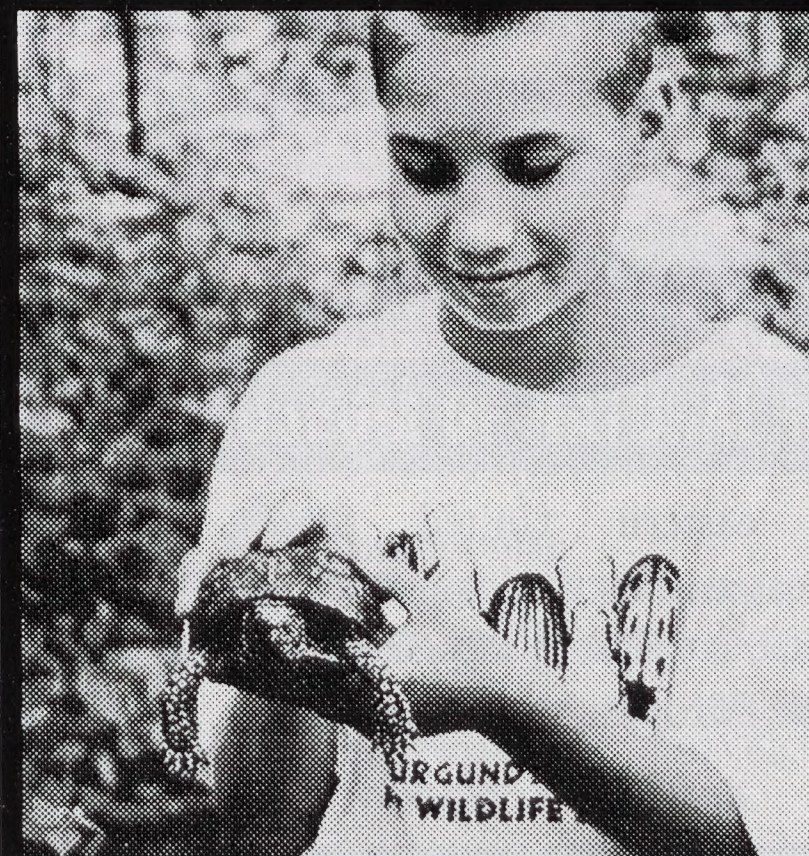
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ANIMAL NEWS

The Smithsonian National Zoo's Great Ape House has once again been visited by the stork. Mandara, the Zoo's 19-year-old western lowland gorilla, gave birth on the evening of November 5, 2001. It is Mandara's fifth offspring, and the



MANDARA AND BABY

second for the father, 18-year-old Kuja. The two are also the parents of Kwame, born November 20, 1999.

An estimated 110,000 western lowland gorillas (*Gorilla gorilla gorilla*) inhabit tropical forests in equatorial Africa. Habitat destruction and poaching for the pet trade and for bushmeat—spurred by civil unrest across Central Africa—continue to imperil this endangered species (see

"Fall of the Wild," in the September/October 2001 *ZooGoer*). Collaborative breeding programs have successfully brought the number of lowland gorillas in North American zoos to more than 350. The National Zoo is currently home to ten lowland gorillas in two groups.

Downhill from the Great Ape House, Berani, the Zoo's three-month-old male Sumatran tiger cub, can now be seen each day from 11 a.m. to 1 p.m. in a renovated indoor exhibit adjacent to the Bat Cave. Berani weighed only 5.5 pounds at two weeks of age but is growing fast—so come see him soon! Read about the winners of the contest—sponsored by FONZ, the Smithsonian National Zoo, and *The Washington Post*

KidsPost—to name the cub by logging onto www.fonz.org.

And in the biggest baby news of all, a male Asian elephant (*Elephas maximus*), weighing a whopping 325 pounds, was born Sunday, November 25 in the Zoo's Elephant House. Both the calf, named Kandula, and his mother, Shanthi, seem to be doing great (see "Really Big News," page 4). Look for more information about the baby, and about Asian elephants in general, in the next issue of *ZooGoer* and on the FONZ website, www.fonz.org and Zoo website, natzoo.si.edu.



SHANTHI'S BABY, KANDULA.

BALLING BUGS

On a much smaller scale, the Zoo's Invertebrate Exhibit has greatly expanded its dung beetle ex-



THE SUMATRAN TIGER CUB, BERANI.

hibit. About 25 dung beetles can now be found in a 65-gallon terrarium, where their new digs allow them plenty of space to perform their distinctive dung-pushing antics. These insects form both spherical balls that they bury for food and pear-shaped balls in which they lay their eggs.

Native to Arizona and Texas, the Zoo's dung beetles, of the species *Canthon imitator*, are fed

dung from the Zoo's collared peccaries (*Pecari tajacu*), fellow denizens of the desert Southwest. The Scarabaeidae family contains about 30,000 species of dung beetle—also known as scarab beetle—found on all continents except Antarctica. The ancient Egyptians fashioned their sacred amulets after these beetles, whose rolling orbs mimicked the daily journey of the sun from east to west. The beetle-headed god Khepri, whose name derived from the Egyptian word for scarab, was believed to push the sun across the sky.

South of the border, 11 black-footed ferrets (*Mustela nigripes*) born at the National Zoo's Conservation and Research Center (CRC) were released into the wild in the Mexican state of Chihuahua on November 8. Staff at CRC have worked to develop assisted reproduction and pre-release training programs that are helping this stealthy predator slowly re-inhabit the western prairie (see "Life Behind the Mask," in the September/October 2000 *ZooGoer*). The Janos, Mexico, site, about 140 miles southwest of El Paso, Texas, boasts one of the largest disease-free populations of prairie dogs—ferrets' primary prey—in North America. Another nine ferrets born at CRC were released at a site in Montana.

BIRDY BLUES

Eastern bluebirds (*Sialia sialis*) are popular residents of meadows, farmlands, and other rural areas in the eastern United States. Threatened by the loss of nesting habitat, as well as by incursions from exotic European starlings (*Sturnus*

vulgaris) and house sparrows (*Passer domesticus*), bluebirds have managed to recover in recent years, thanks in large part to the installation of nestboxes by thousands of landowners.

The bluebird boxes at the Zoo's Conservation and Research Center

in Front Royal, Virginia, are in need of their annual cleaning and repair before the birds' spring mating season. Now is your chance to lend a hand for these beautiful birds while visiting CRC's bucolic property in the foothills of the Shenandoah Mountains. FONZ families are in-

vited to help out on Saturday, February 23, from 10 a.m. to 2 p.m. Bring a bag lunch; coffee and hot chocolate will be provided to warm you up. Call 202.673.4962 for directions or for more information.



KOMODO DRAGON.

DRAGON LAIRS

Shifting from mega-mammals to mega-lizards, the Zoo is planning to expand exhibits for our Komodo dragons, the world's largest reptiles. Wild Komodo dragons (*Varanus komodoensis*), which dwell on the Indonesian islands of Komodo, Rinca, Flores, and Gili Motang, grow to upwards of ten feet in length. These fierce predators will hunt down and eat large prey like deer, boar—and other Komodo dragons. Only an es-

timated 5,000 Komodo dragons remain in the wild. Discovery Center, where the Zoo hopes to add outdoor exhibit space so these cold-blooded creatures can lounge in the sun's warm rays. Plans include building a gently sloping grassy terrain, and excavating a pool in which the lizards can cool off, to create a more naturalistic environment that both visitors—and the dragons—can appreciate.

The FONZ Annual Appeal is raising money to fund this exciting project. Log onto www.fonz.org/store/komodo.htm or call 202.673.4961 to make a donation to the Komodo Dragon Fund.

Friends of the National Zoo would like to thank the following sponsors of our first-ever Black & White Gala:

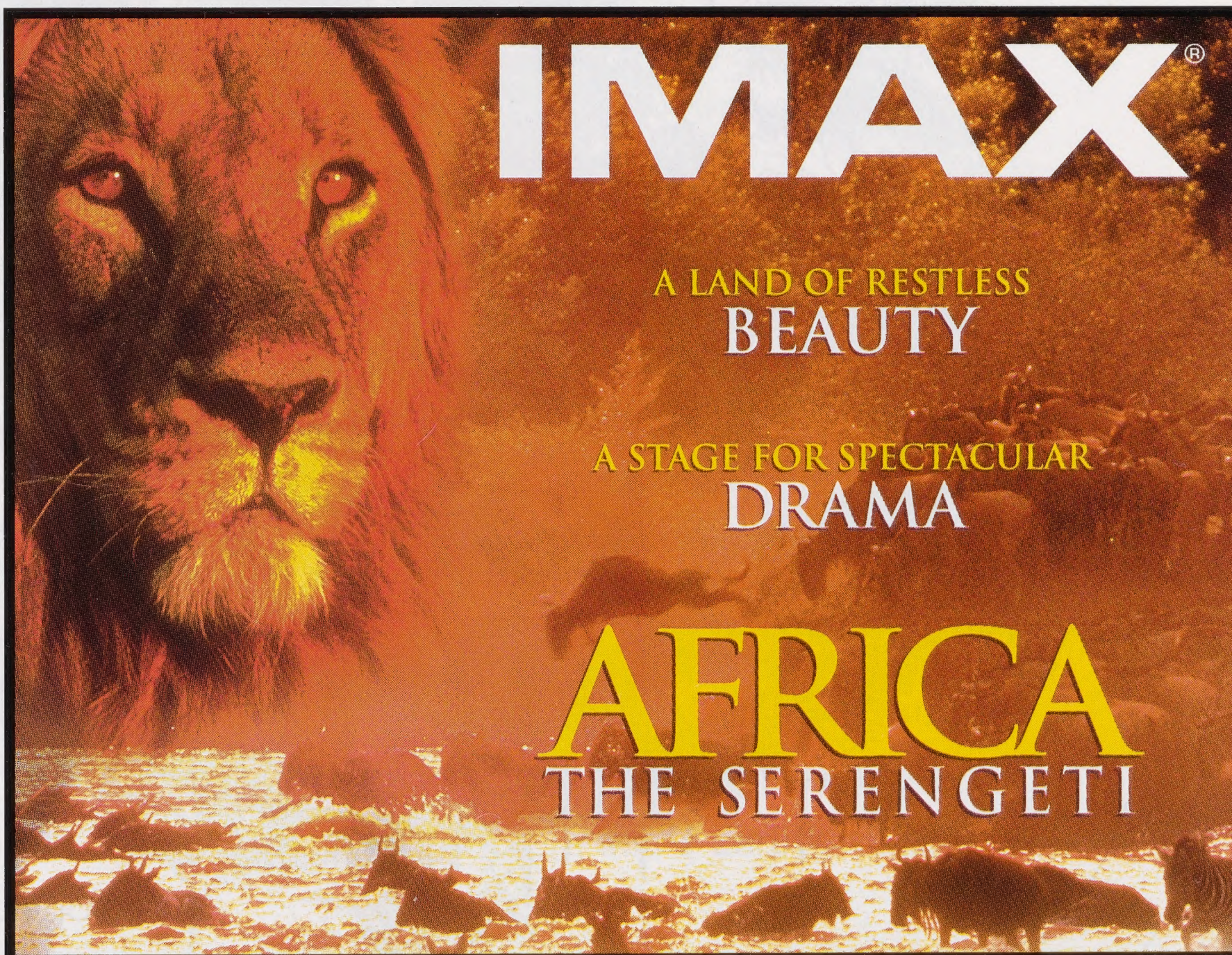
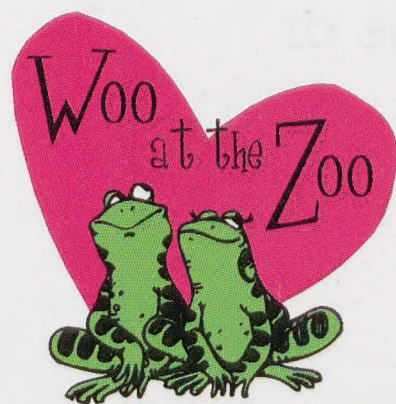


TAKE A DIVE

The FONZ Young Professionals (YP) Program is leading a Florida Keys "Eco-Adventure" February 19-24. The trip includes kayak trips (with kayaking lessons offered) into a maze of mangrove creeks, snorkeling in the coral canyons of Looe Key, and a guided nature hike on Big Pine Key. You might spot barracudas, ospreys, manatees, rare Key deer—and even Ernest Hemingway's house—all on this one amazing expedition. The cost of the trip, which is available only to FONZ YP members, is \$1,350 from Key West, Florida. For more information, call 202.673.4953 or log onto www.fonz.org/getinv/travel/YPKeys.htm.

WOO AT THE ZOO

This Valentine's Day, show your special someone your wild side as you learn about the birds and the bees from the experts at the National Zoo. FONZ is hosting its second annual "Woo at the Zoo" on Thursday, February 14, from 7 to 10 p.m. Take a romantic journey through the Elephant House, the Small Mammal House, and Amazonia, where keepers will enthrall you with the amorous activities of their young and restless residents. Enjoy drinks and hors d'oeuvres throughout the evening, with delectable choices in each exhibit. Admission is \$150 per couple for FONZ members, \$200 per couple for non-members. Last year's event sold out early, so register online at www.fonz.org/events/woo.htm or call 202.673.4613 before it's too late!



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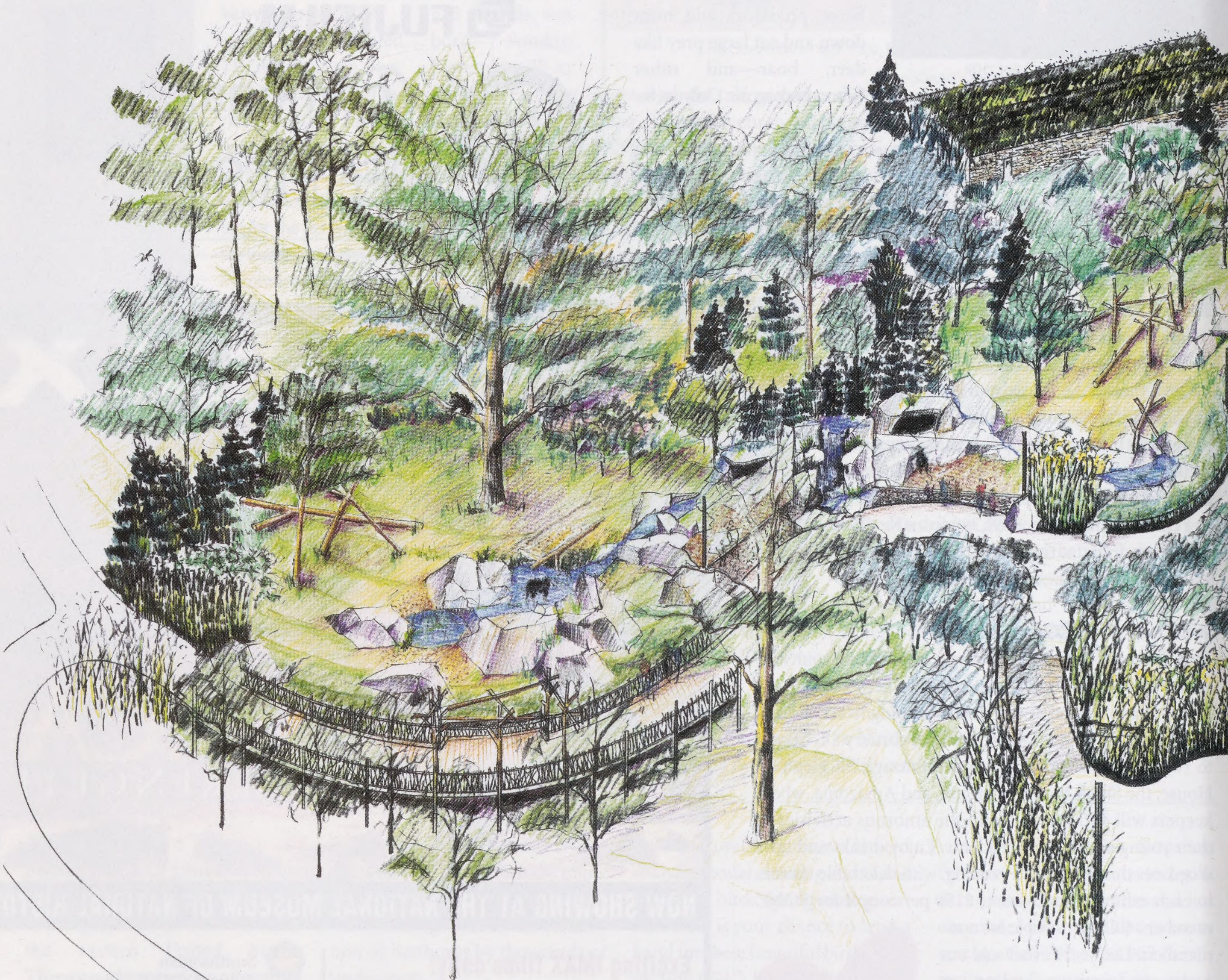
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BY LUCY H. SPELMAN

MY VISION FOR THE



At the Smithsonian National Zoological Park, our mission is to study, celebrate, and help protect the diversity of animals and their habitats.

FUTURE



The Smithsonian National Zoo is one of the finest zoos in the world. It is also a historic park in need of renovation. What's more, in the face of continuing fiscal austerity, it has become increasingly hard to maintain the standards of excellence that have made ours a great zoo. Thus, I have these goals for the future:

First, I plan to revitalize and modernize the Zoo's aging facilities so we are recognized for creating innovative, state-of-the-art environments for our animals and our visitors.

Second, I plan to maintain and increase our preeminence among zoos in providing the highest quality of care for animals and in conducting outstanding scientific research in the fields of reproductive biology and conservation biology of endangered species.

Third, I hope through these efforts to nourish and strengthen the bond between people and animals, a relationship that is fundamental to the future of the Earth's wildlife and wildlands.

Finally, I am determined to raise the resources necessary to achieve these goals.

OUR STRENGTHS

The current strengths of the Zoo make these ambitious goals attainable. The Zoo now attracts three to four million visitors each year, welcoming them free of charge. Entering the gates, visitors are transported from the urban bustle of the nation's capital to the world of wildlife—nearly 250 different animal species. Visitors can explore a beautiful 163-acre park studded with trees and century-old plantings and dotted with historic buildings. Our visitors get close to the animals through innovative exhibits and creative education programs. The Zoo is a place where one can escape the winter chill in the warmth and humidity of Amazonia, or cool off in the summer heat walking through refreshing misters on Olmsted Walk.

We are as committed to caring as well for our visitors as we do for our animals. As we modernize our oldest areas and develop new exhibits, we expect many more people will come to discover what's new and leave inspired to care about the animals they've met.

The Zoo is already home to wonderfully diverse animals, ascending in size from ants to elephants. We plan to expand the variety of species still more while we group their exhibits based on their geographic origins, for example, with Asian species arrayed in one area, African ones in another.

For many of our species, we offer wonderful habitats that stimulate the animals' natural behavior, promote their well-being, and also provide a setting for detailed scientific observation. In this way, we are working to advance understanding and conservation of animals and their habitats. Our exhibits are programs as well as places, combining education, research, and conservation.

We provide for our animals a regimen of health care that reflects the most sophisticated advances in veterinary medicine. We are at the forefront of this field, and have a long-standing commitment to training veterinary professionals.

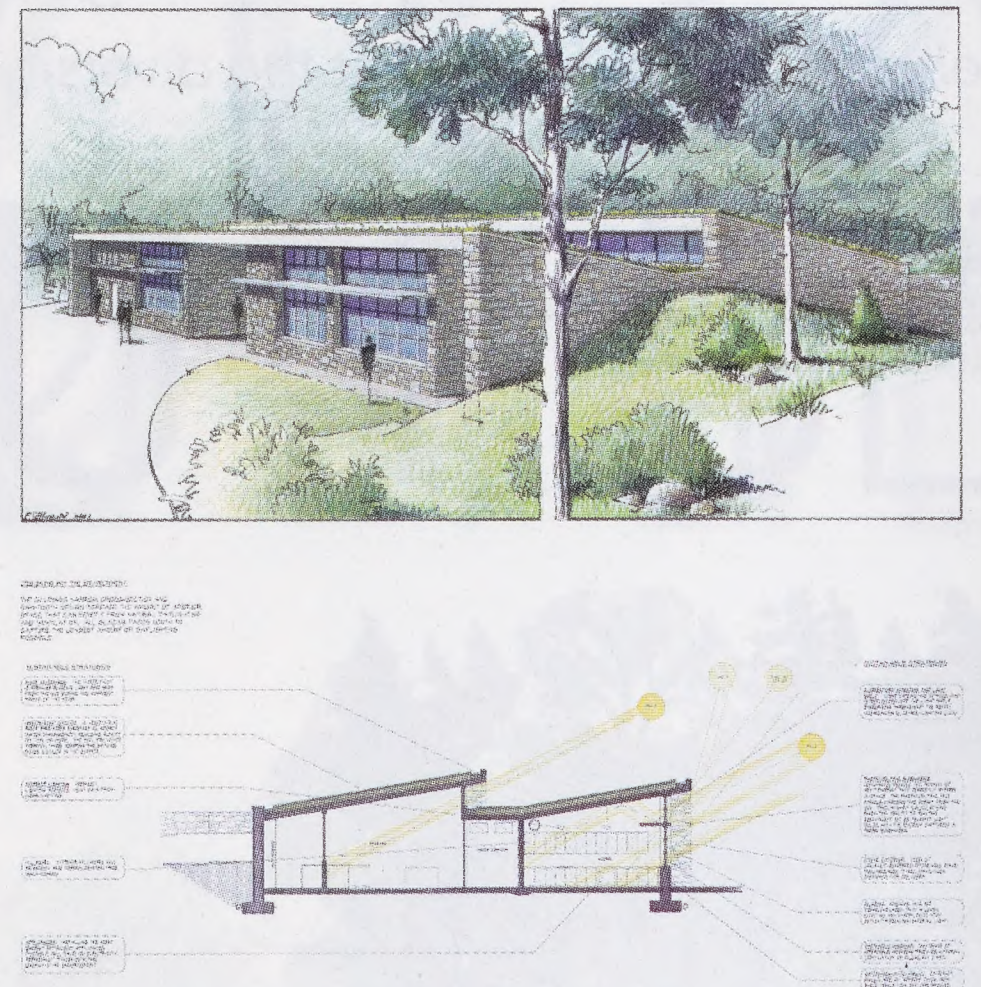
We are fortunate to have an extraordinarily dedicated and talented staff, known worldwide for their expertise in animal management and the scientific study of endangered species, including reproductive biology, conservation biology and ecology, behavior, and wildlife management. By connecting our research efforts more explicitly to the exhibits and the animals on display, we hope to share more of this work with the public.

OUR NEEDS

The Zoo is more than 110 years old and its age and popularity have taken a visible toll. The Zoo's physical environment is deteriorating. Many of our largest creatures—lions, tigers, bears, elephants, giraffes, hippos, rhinos—are housed in our oldest areas. Yet families come to the Zoo primarily to see these species, often called "charismatic mega-vertebrates." The sloth bear exhibit was built in the late 1890s, for example, and the Elephant House in the 1930s. Other facilities in the Zoo—for the seals and sea lions, birds, small mammals, and reptiles—have structural problems.

We need adequate financial resources to re-create, restore, and revitalize these crumbling spaces, to provide a physical environment for all of our animals and our visitors that is state-of-the-art.

PLANNED SLOTH BEAR INDOOR HOLDING.



THE ZOO IS MORE THAN 110 YEARS OLD AND ITS AGE AND POPULARITY HAVE TAKEN A VISIBLE TOLL. MANY OF OUR LARGEST CREATURES—LIONS, TIGERS, BEARS, ELEPHANTS, GIRAFFES, HIPPOS, RHINOS—ARE HOUSED IN OUR OLDEST AREAS.

The size of both our staff and our operating budget (the money that remains after we pay salaries) is at an all-time low. The staff and resources are stretched thin by the increased range and urgency of our responsibilities to the animals, our visitors, and the future of wildlife.

We need adequate financial resources to ensure that we have a large enough staff with the highest quality skill to adequately meet these responsibilities.

We are off and running, already in the first phase of the Zoo's physical renewal. We have renovated our wolf exhibit for endangered Mexican wolves and remodeled Monkey Island for a dynamic group of ring-tailed lemurs and a pair of red-fronted lemurs. We built a new picnic pavilion and are renovating our restaurant with funds from the federal government and FONZ. A new "Kids' Farm," made possible by funds from Congress, will open within the next two years. And soon, a magnificent pair of bronze lions will grace the entrance to the Zoo on Connecticut Avenue.

Thanks primarily to the generosity of Fujifilm, we have completed our campaign to raise private funds for a new Giant Panda Conservation Habitat. We will build the Habitat after having studied the giant pandas Mei Xiang and Tian Tian in their current habitats. We are learning their preferences and documenting their ways, so the new habitat will be tailored to their needs. What we learn will also help our efforts to conserve wild pandas in China, where panda habitat is rapidly being degraded as a result of China's growing human population and changing land use.

We need new major additional funding to continue to progress toward achieving our goals.

THE NEXT STEPS: THE ASIA TRAIL

Giant pandas figure prominently in our plans for an exciting new Asia Trail. The Asia Trail will begin just inside the main entrance of the Zoo, where visitors will encounter the new Sloth Bear Habitat. This state-of-the-art

THE ASIA TRAIL WILL CONNECT EXHIBITS FOR CHARISMATIC—AND ENDANGERED—SPECIES LIKE SLOTH BEARS, GIANT PANDAS, AND ASIAN ELEPHANTS.



VISITORS WILL OBSERVE SLOTH BEARS AT THEIR INTERACTIVE BEST: DIGGING FOR TERMITES AND ANTS AND ROOTING IN THE DIRT FOR OTHER FOOD ITEMS.



exhibit will highlight this little-known bear species. Like giant pandas, sloth bears come from the forests of Asia, specifically Sri Lanka and India. Happily, sloth bears do not live up—or down!—to their name. Sloth bears are experts at digging up ant and termite colonies and sucking up the insects through a gap in their teeth. These active and engaging creatures root out ants and termites with their long claws and powerful snouts, and climb trees to pluck fruit or knock down bee hives. Visitors will be able to watch these engaging animals from just inches away, through thick plexiglass walls that afford unrestricted views of their activities. Whether digging, climbing trees, or turning over rocks and logs, sloth bears are on the move for food and are captivating to watch. When people can see all this activity, sloth bears might rival our giant pandas for the public's attention and affection. They are celebrities waiting to happen.

Down the Asia Trail from the Sloth Bear Habitat will be the Fujifilm Giant Panda Conservation Habitat, an expansive naturalistic exhibit. The

multi-faceted giant panda education program, also funded by Fujifilm, will inform visitors about the extensive ten-year research plan for giant pandas, and inspire the public to care about the future of endangered animals by caring about their habitats.

At the end of the Asia Trail will be a remarkable transformation of the existing exhibits of another Asian favorite—the Zoo's Asian elephants. The exhibit space for this endangered species, currently in the historic Elephant House, will be greatly expanded in size and include natural water sources, varied terrain, and extensive plantings reminiscent of their natural habitats. By quadrupling the current living space of our Asian elephants, we will be able to expand the Zoo's existing population and launch an extensive breeding program. We will continue to study the reproductive biology, behavioral preferences, and conservation biology of Asian elephants and to collaborate with conservation organizations around the world to secure their future in the wild.



SLOTH BEARS ARE EXPERTS AT DIGGING UP ANT AND TERMITE COLONIES AND SUCKING UP THE INSECTS THROUGH A GAP IN THEIR TEETH.



Pandas, sloth bears, and elephants are the mega-residents of the Asia Trail. Other fascinating species we may exhibit on the Asia Trail include fishing cats, takin, tufted deer, and red pandas.

We are also committed to sharing with our visitors more of the “hidden zoo”—activities the public does not normally see that are essential to the daily workings of the visible Zoo. As far as possible, we want to lift the curtain and let people observe firsthand what a complex, challenging, surprising, and exciting institution the Zoo is behind the scenes. The media will help us do this. Animal Planet, for example, is producing a 13-part series about daily life at the Zoo, and it plans multiple television specials on the giant pandas. With the help of FONZ, we plan to broaden the reach of our education programs for school children, expand our presence on the Web, and increase the number of educational special events for the public. Finally, through our interpretive programs, we will educate visitors about

our efforts to ensure the well-being of the creatures in our care, to stabilize their populations in zoos worldwide, and to promote their conservation in the wild.

All of the elements are in place to make the National Zoological Park one of the most genuinely exciting and creative zoos of the world. But we will need the help and support of many partners to make our vision a reality. I invite all of you to be part of this extraordinary adventure. Z

—Formerly the Zoo’s chief veterinarian, Lucy Spelman was named Director of the Smithsonian National Zoo in June 2000.

To learn about how you can support Director Spelman’s plans for a new Asia Trail, log onto www.fonz.org/getinv/asianstars.htm.



Hummingbirds: Frantic and Fascinating



JESSIE COHEN/NZP

"A glittering fragment of the rainbow...a lovely little creature moving on humming winglets through the air, suspended as if by magic in it, flitting from one flower to another...." Thus did John James Audubon describe hummingbirds in the early 19th century. Other scientists fascinated by these mesmerizing birds have bestowed upon them names such as purple-crowned fairy, green-breasted mango, glittering-throated emerald, sapphire-vented puffleg, fiery topaz, peacock coquette, and shining sunbeam.

BY TERRY DUNN

ating

THE APTLY NAMED MAGNIFICENT HUMMINGBIRD (*EUGENES FULGENS*).

LEFT: VIOLET-FRONTED BRILLIANT
(*HELIODOXA LEADBEATERI*).
BELOW, LEFT: CRIMSON TOPAZ
(*TOPAZA PELLA*).
BELOW, RIGHT: A PAIR OF FRILLED
COQUETTES (*LOPHORNIS MAGNIFICA*).

No doubt our

admiration began the first time a hummingbird bolted out of the blue and hovered in front of a person's startled eyes. Hummingbirds certainly didn't escape the notice of early human residents of the Americas. Some of the most intriguing myths and legends come from the Maya, who believed that hummingbirds were the sun in disguise. Huitzilopochtli, the most powerful Aztec god, was thought to come from a ball of hummingbird feathers that fell from the sky. Today, in some parts of Central and South America, dead hummingbirds are dried and ground into magical powders used to attract money, power, or romance.

Wild hummingbirds grace the New World solely. Seeing them for the first time, Spanish explorer Gonzalo Fernandez de Oviedo y Valdes speculated that they were large insects or a cross between insects and birds. Christopher Columbus may have been referring to them when he described, "Little birds...so different from our own it is a marvel" in his journal entry for October 21, 1492. It didn't take long for news of these flashy birds to reach the Old World. Only a few years after the arrival of Columbus, a hummingbird skin was sent to Pope Leo X in Rome.

By the late 19th century, hummingbirds were well-known in Europe, but with fame came exploitation. A growing market in London and other European cities for their skins, bodies, and feathers fueled the killing of hundreds of thousands of hummingbirds. Feathers were used for hat decorations. The skins were used in collections and to make artificial flowers and dust catchers. Preserved hummingbird bodies were paired with flowers and arranged like museum dioramas on top of women's hats. The trade in hummingbirds escalated to a point where, in a single year, one London dealer imported 400,000 hummingbird skins from the West Indies.

Not until the passage of the Migratory Bird Treaty Act of 1918, which prohibited commercial trade in any migratory bird species or its feathers, were conservationists in the United States able to change the tide of fashion and slow the decline in hummingbird populations. The number of species already driven extinct by that time remains a mystery.



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THE BOLD AND THE BEAUTIFUL

While the majority of the 328 species of hummingbird inhabit the tropics, hummingbirds can be found from Argentina to Alaska, from sea level to 15,000 feet, and from humid jungles to deserts, temperate forests, grasslands, coastlines, and

bill. Then, when chicks are fledged or flowering is over, they may abandon their fiercely protected territory and move on.

Scientists and bird-watchers have spent lifetimes trying to unlock the mysteries of the hummingbird family, called the Trochilidae. Early

those of other birds, hummingbirds' elbows and wrist bones are fused and virtually immobile. Yet the range of motion at the shoulder is a full 180 degrees. Most birds are capable of creating lift only on the wing's downstroke. For a hummingbird, every wing motion is a power stroke, as



BLUE-CHINNED SAPPHIRES (*CHLORESTES NOTATUS*) INHABIT NORTHERN SOUTH AMERICA.

urban areas. In some species, individuals cover very little territory in their daily activities, often staying close to a single flowering plant all day. In others, the birds range farther, yet sometimes travel a similar route each day.

Hummingbirds from across the spectrum of species are known for their aggressive personalities. They will defend their breeding and feeding turf by dive-bombing competitors and occasionally stabbing them with their needle-like

observers were convinced that no bird could fly backward. George Campbell, Duke of Argyll, declared that hummingbirds just “fell backward” out of a flower when they were finished feeding. Charles Darwin was among the first credible scientists who tried to figure out how hummingbirds fly. He concluded that hummingbirds expand and contract their tail feathers to stay aloft in a vertical position. However, the real answer lies in their wings rather than their tails. Unlike

lift is created on both the downstroke and the upstroke.

Hummingbird flight is often compared to that of a helicopter. According to H. Ross Hawkins, founder of the Hummingbird Society—and a man who admits to bird-watching from his window before getting out of bed—there are some important distinctions. “The difference is that the hummer’s wings go back and forth, switching the angle with each stroke, while the heli-

copter [propeller] moves around continuously,” says Hawkins. “Both oscillatory and rotating wing motion create lift [in a helicopter], but the hummer’s lift is balanced and has no tendency to make the bird rotate,” he explains. The pattern of the wing-beat is more of a figure-eight than a circle like a helicopter or an up and down motion like other birds. With this motion, hummingbirds can use their unusual wings to hover, fly forward, fly backwards, and even fly upside down.

But wings alone don’t tell the whole story. A hummingbird’s powerful chest muscles account for a third of its overall body mass. Those muscles help the bird achieve wing-beats up to 90 beats per second when hovering, and double that during a power dive. Perhaps to save weight, hummingbirds lack down feathers—the fluffy feathers closest to a bird’s skin that help it stay warm. This and other weight-saving tactics enable the birds

homemade wind tunnel with a fan at one end and feeder at the other. He placed hummingbirds in the wind tunnel and revved the fan at various speeds. Hungry hummers could reach the feeder in the face of winds just under 30 m.p.h.—the apparent upper limit of their speed in the wind tunnel. Retreating from the feeder in a strong wind, the birds wound up flying on their backs with their tails toward the feeder, ending their getaways with a semi-roll.

Hummingbird feathers have offered another fertile source for scientific investigation. Surprisingly, these feathers come in only two pigment colors: a reddish brown and black. However, some hummingbird feathers contain granules of melanin and microscopic air bubbles that refract light and help create a metallic sheen. Depending on the arrangement of the melanin granules and the air bubbles, different colors of the spectrum

white-tipped sicklebill (*Eutoxeres aquila*) has a curved bill that enables it to take advantage of the curved corollas of wild plantains and heliconia flowers.

A hummer that feeds mainly on one particular species is more likely to transport pollen among flowers of the same species rather than transporting it to another species—for example, fuchsia pollen to a heliconia. Flowers have other strategies for making sure their pollen is going to the right place. For instance, in one Arizona location where Indian paintbrush (*Castilleja integrifolia*), beardtongue penstemon (*Penstemon barbatus*), and other flower species are pollinated by rufous (*Selasphorus rufus*), broad-tailed (*Selasphorus platycircus*), and black-chinned (*Archilochus alexandri*) hummingbirds, the placement of the anther and stigma are oriented differently in each flower species, ensuring that

CHRISTOPHER COLUMBUS MAY HAVE BEEN REFERRING TO HUMMINGBIRDS WHEN HE DESCRIBED, “LITTLE BIRDS...SO DIFFERENT FROM OUR OWN IT IS A MARVEL” IN HIS JOURNAL ENTRY FOR OCTOBER 21, 1492.

to reach speeds of up to 30 miles per hour in normal flight. Males can dive at twice that speed when trying to impress a female.

In the late 1950s, Crawford H. Greenewalt, then president of E.I. du Pont de Nemours & Company, blended his twin hobbies of bird watching and photography to design a system for capturing hummingbirds’ wing-beats on film. At the time, the typical motion picture camera took about half a second to go from zero frames per second to full speed—too long for a human finger to trip the switch and catch a hummingbird image, much less a full wing-beat. The solution was to develop a camera that started instantly when the subject flew into a beam of light shining on a photocell, in a sense allowing the bird to take its own picture. Using this setup, Greenewalt was able to get rolls of images that not only captured the motion of hummingbird wings but could aid in the calculation of wing-beat speed.

Calculating flight speed was another matter. To tackle this challenge, Greenewalt developed a

appear. When light is not shining on an iridescent feather at the correct angle, only the pigment colors can be seen, and the bird appears dull. Gaze at the feathers at just the right angle though, and you will be treated to a show of spectacular, but fleeting, color.

THE NEED TO FEED

Perhaps nowhere else is the interdependence of fauna and flora so obvious as in hummingbirds and flowers. A hummingbird’s long bill is the perfect probe for reaching nectar at the base of tubular-shaped flowers. Differences in bill length and shape between species often appear to correlate with variations in the types of flower they visit, suggesting that hummingbirds and certain flower species co-evolved. For example, the Andean sword-billed hummingbird (*Ensifera ensifera*), with a bill length up to 4.1 inches, prefers to feed from a passion flower species with a corolla length of about 4.5 inches, making the hummer’s bill and extended tongue just long enough to sip the nectar from this large flower. Meanwhile, the

different parts of the hummingbird carry the pollen to the right target on the next flower.

Inside a hummingbird’s lengthy bill, its tongue is divided into two fringe-edged tubes. The tongue extends into a flower, picks up some nectar with the fringed tips, and draws the nectar in. The nectar is scraped off when the tongue is extended out of the bill as the bird reaches for more nectar. Like so much in hummingbird life, the whole process happens fast: The birds can take as many as 12 slurps of nectar per second.

For hummingbirds, frenetic foraging rules their daylight hours. It’s no wonder. Hummingbirds have the greatest relative energy output of any warm-blooded animal. Their high metabolic rate fuels an internal furnace that keeps their tiny bodies warm and creates a resting heart rate of around 500 beats per minute and a wing-beat that is blindingly fast. It’s a vicious cycle: This supercharged strategy, which requires them to consume more than their body weight in food each day, is necessary in part because they hover while they feed. As calories are quickly burned,



The doorway into the Smithsonian National Zoo's Pollinarium exhibit draws visitors into a verdant habitat painted by the petals of heliconia, pentas, red salvia, blue porterweed, and other flowering plants. Butterflies float by on wings that flutter lazily in the silence. But if one listens carefully, the quiet may be interrupted by a faint hum—which blossoms into a buzz when a sprightly figure darts to the fore and hovers in mid-air. This airborne magician is none other than the Costa's hummingbird (*Calypte costae*).

A male and female Costa's hummingbird arrived at the National Zoo in April 2000. Last February, the female hatched two chicks, who soon joined their parents zipping through the exhibit. To advance zoo breeding efforts for the species and avoid possible conflict between father and son, the male chick was sent to the National Aviary in Pittsburgh in November. With the unexpected death of the father last spring, a male Costa's from another institution may eventually join the remaining mother and daughter in hopes of breeding and further expanding the diversity of Costa's in zoos.

Costa's hummingbirds of both sexes shimmer with a greenish bronze hue across much of their bodies. The crown and gorget of males glisten in iridescent violet or magenta when the sun strikes at the right angle. About half of adult females display a tuft of purple on their throats. Costa's are often mistaken for Anna's hummingbirds (*Calypte anna*)—their closest relatives—in the field, confounding study of their distribution.

Wild Costa's hummingbirds primarily range from southern Nevada, Arizona, and California to northwestern Mexico and Baja California. The birds are occasionally sighted as far north as British Columbia and even Alaska. The proliferation of birdfeeders and exotic plants in urban backyards could explain the Costa's apparent expansion into the Pacific Northwest, while plantings of non-native tree tobacco (*Nicotiana glauca*) may have encouraged their recent spread eastward into parts of New Mexico and Texas.

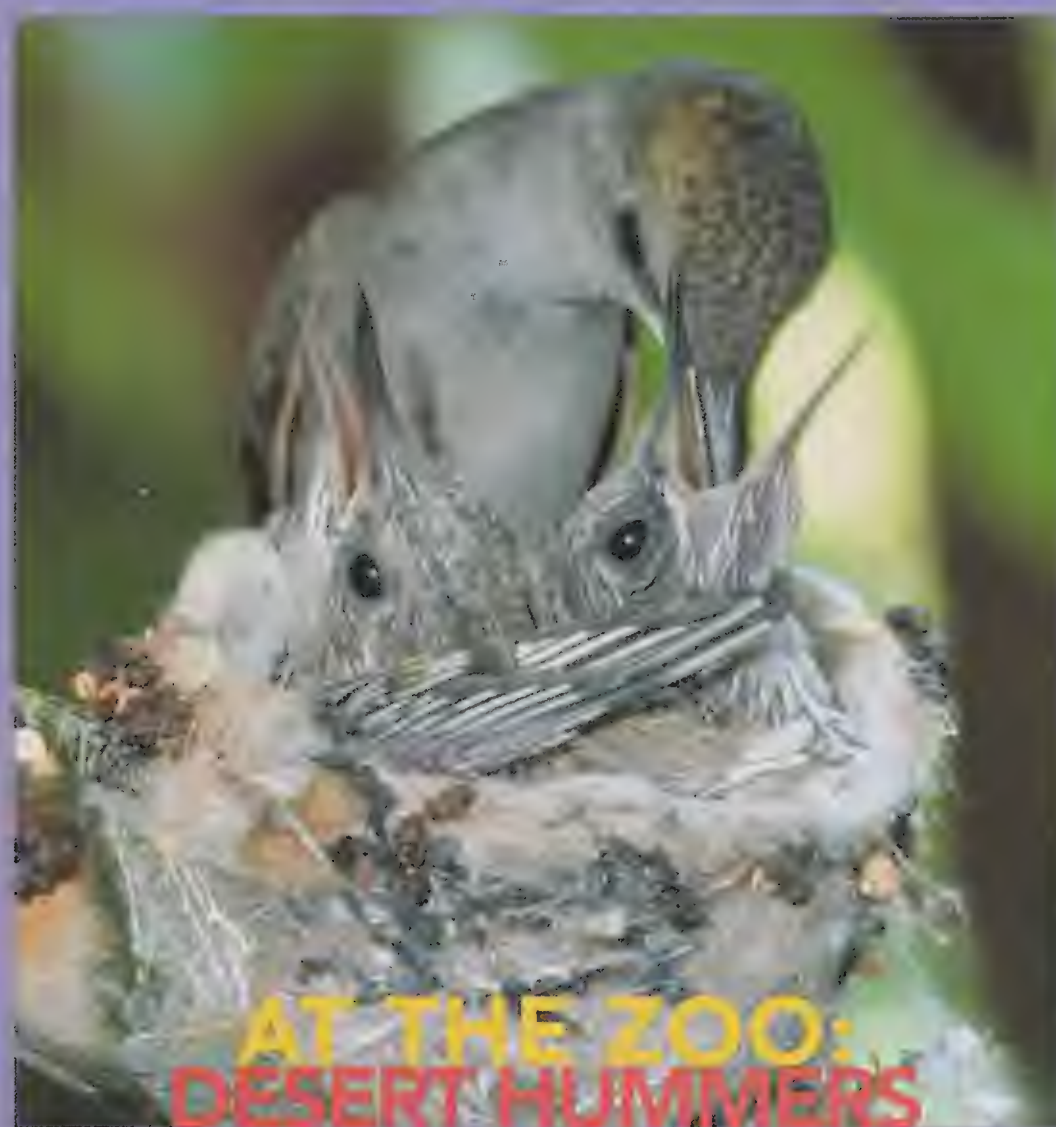
Costa's habitat includes chaparral, coastal scrub, desert washes, and other generally arid terrain. The hummingbirds migrate seasonally in search of various species of cacti, desert lavender (*Hyptis emoryi*), and other flowering plants.

Those birds that inhabit the Sonoran Desert in the winter months, for example, often escape to the Pacific coast for summer. In the Sonoran, the favored red flowers of ocotillo (*Fouquieria splendens*) bloom fruitfully in early spring, while chuparosa (*Justicia californica*) flowers offer plentiful nectar throughout winter. (Fittingly, *chuparosa* is one of several words for hummingbird in Spanish.) Like most hummingbirds, Costa's rely on nectar to fuel their high-energy lifestyle. These agile birds also snatch flies out of the air and may prey upon insects and spiders crawling on branches and tree trunks. At Pollinarium, Costa's hummingbirds feed on fruit flies and a nectar blend rich in protein and carbohydrates.

The timing of Costa's breeding varies with latitude and climate. Males emit a shrill whistle—once compared to "the highest and sharpest note that can be made on a violin"—to impress females during swooping display dives. Both males and females defend breeding and feeding territories (if nectar is not superabundant) as well as nesting sites. Females fabricate nests in shrubs several feet above ground, using spider webbing to hold nests in place and leaf litter for camouflage. They almost always lay two eggs, which

incubate for 15 or 16 days on average. Young Costa's first leave the nest at about three weeks of age.

One of the smallest hummingbirds found in the United States, adult Costa's weigh three grams on average (one-tenth of an ounce)—about as much as a penny. Their diminutive size, which allows the birds to shed excess heat, is likely an adaptation to their unforgiving, arid surroundings. Once the lords of these desert realms, Costa's are increasingly finding company, however. University of Arkansas at Little Rock biologist William Baltosser, the foremost expert on Costa's hummingbirds, speculates that people installing hummingbird feeders and exotic plants in their backyards are helping larger hummer species to muscle Costa's out of parts of their historic range. Alteration and development of Costa's habitat—particularly of California's coastal scrub—and the planting of combustible, non-native grasses for cattle forage pose further threats to their survival as a species. Z



AT THE ZOO:
DESERT HUMMERS
ALEX HAWES

JESSIE COHEN/NZP

the search for food is a near-constant activity. Calories most often come in the form of high-energy nectar—although, in some tropical species, insects may account for nearly 100 percent of a hummer's diet.

At night, many hummingbird species lower their metabolism, going into torpor. Whether or not an individual hummer enters torpor depends on the temperature and how well nourished the bird is as night falls. If a bird's body temperature drops 30 to 50 degrees below daytime levels, its heartbeat will slow to as low as 160 beats a minute, and its breathing will nearly stop. Like a person who can't function before their morning cup of coffee, a hummingbird coming



CROWNED WOODNYMPH (*THALURANIA COLOMBICA*).

© T.J. ULRICH/VIREO

Once the ruby-throats have had anywhere from a day to a week's rest in Texas and Florida, they move northward at a rate of about 20 miles a day. According to Bob Sargent, a long-time bird bander and hummingbird enthusiast, "The birds come back to the same sites year after year. They are consistently caught at the same feeders." However, the birds stay at a feeder only for a day

miles), and 29 species were long-distance migrants that moved greater than 1,000 kilometers. That's not to say that other hummingbird species aren't migrating, but the information on their movements remains sketchy. Still, it's surprising how much tropical hummingbirds are getting around. "The conclusion," says Rappole, "is that migration is a very widespread phenomenon in the tropics."

For hummingbird species that migrate, healthy patches of several habitat types are needed for survival. Birdlife International lists 19 hummingbird species that are endangered, nine of which have a fifty-fifty chance of going extinct

THE PATTERN OF THE WING-BEAT IS MORE OF A FIGURE-EIGHT THAN A CIRCLE LIKE A HELICOPTER OR AN UP AND DOWN MOTION LIKE OTHER BIRDS. WITH THIS MOTION, HUMMINGBIRDS CAN USE THEIR UNUSUAL WINGS TO HOVER, FLY FORWARD, FLY BACKWARDS, AND EVEN FLY UPSIDE DOWN.

out of torpor may need 10 to 15 minutes to recover before it can fly again. Dramatic shivering increases the bird's internal temperature, raises its heartbeat, and stimulates breathing until it is ready for another frantic day in the air.

MIGRATING OVER THE MILES

Despite their high caloric needs, some species manage to migrate thousands of miles each year. Fifteen hummingbird species breed in the United States and Canada, almost all of which migrate from winter range in Mexico and Central America. The ruby-throated hummingbird (*Archilochus colubris*), however, stands out as the overachiever of the group. Ruby-throats winter between southern Mexico and Panama. By February, they are spending their days fattening up on the Yucatán coast, preparing for their flight across the Gulf of Mexico. They double their weight from just over three grams (or one-tenth of an ounce) to more than six grams. After leaving at dusk for a nonstop, 18-to-22-hour flight across 500 miles of water, the birds arrive on the U.S. Gulf Coast weighing only 2.5 grams. This journey seems so improbable that a persistent rumor circulates that the ruby-throats piggyback on bigger birds.

or two before continuing their whirlwind tour up through the eastern U.S.

The banding work of Sargent and others is slowly contributing to our knowledge of hummingbird movements. Until recently it was believed that ruby-throated hummingbirds were the sole species east of the Mississippi. Sargent knows otherwise. "There are a lot more hummingbirds in the eastern U.S. than anyone dreamed of," says Sargent. There are now records of 14 different species visiting the eastern U.S., although many of these are rarely seen.

If tracking hummingbird migration to and from the U.S. is difficult, it's even harder to keep tabs on the movements of hummingbirds within the tropics. John Rappole, research biologist at the Smithsonian National Zoo's Conservation and Research Center, and Karl Schuchmann, curator of birds at the Alexander Koenig Museum in Bonn, Germany, have recently combed through the available data on hummingbird movement in the tropics.

They found that 87 species were altitudinal migrants—moving between lower and higher elevations with the changing seasons—while 42 species were latitudinal migrants that traveled between 10 and 1,000 kilometers (6.2 and 621

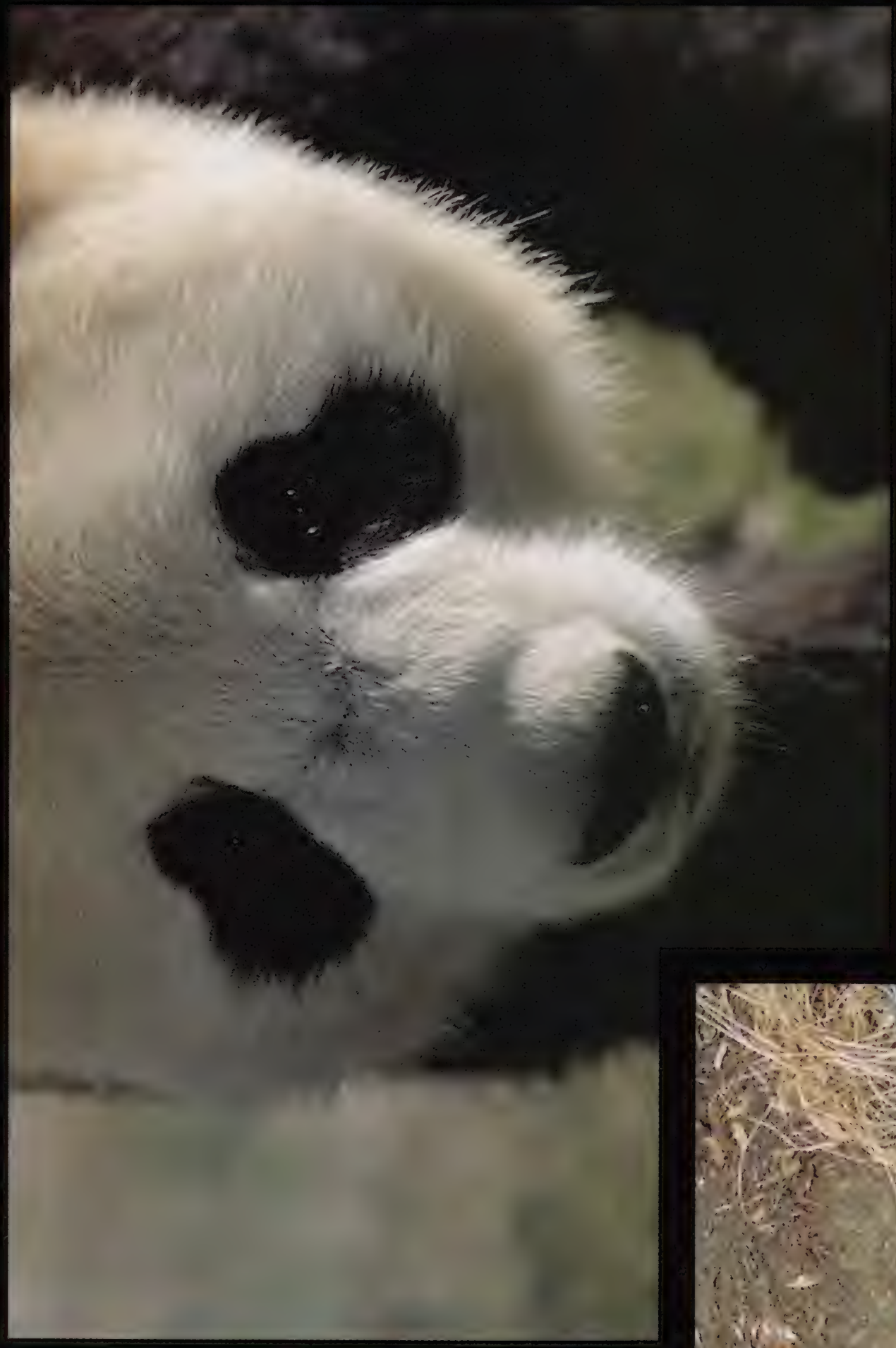
in the next five years. The World Conservation Union "Red List" contains dozens of endangered and threatened hummingbird species throughout the Americas, including the Honduran emerald (*Amazilia luciae*), the mangrove hummingbird (*Amazilia boucardi*) of Costa Rica, and the short-crested coquette (*Lophornis brachylopha*) of Mexico. They are threatened primarily by habitat alteration in all its incarnations: Urban development, expansion of agriculture, logging, road building, and even pipelines through tropical forests nibble away at the habitats hummingbirds live in and fly through. The Honduran emerald, for instance, has already lost much of its habitat, and more road building threatens what's left.

Too small to track with radio transmitters and elusive in their habits, hummingbirds provide many further challenges for scientists and concerned bird-watchers. As Bob Sargent confesses, "The face of ignorance is the one I'm shaving. But ignorance is the great motivator." Z

—Terry Dunn is a freelance writer, environmental educator, and artist living in Albuquerque, New Mexico.

A YEAR

美香



JESSIE COHEN/NZP



JESSIE COHEN/NZP



THEIR

LIFE

Time flies when you're having fun watching giant pandas. Hard as it is to believe, it's already been a year since Mei Xiang and Tian Tian first greeted the public on January 10, 2001. Nearly 3 million people have passed through the National Zoo's Giant Panda Conservation Habitat since the pair's debut—more than visited Paramount's Kings Dominion, Dollywood, or the Detroit Tigers (that's *Panthera tigris*, sports fans) in Comerica Park over that same time. Guests to the Giant Panda House have included former President Bill Clinton, Vice President Dick Cheney, Queen Noor of Jordan, and a rainbow of visitors from around the globe.

Each day, Zoo staff are learning more and more about Mei's and Tian's unique personalities. Their characteristic patterns of eating, sleeping, playing, interacting with enrichment objects, and using their exhibit space are emerging. Staff hope that insight into the pandas' behavior at the National Zoo will prove abundantly instructive in improving the care of giant pandas in zoos around the world.

Working closely with Mei Xiang and Tian Tian further allows Zoo scientists to investigate complex physiological and behavioral questions about giant pandas that are nearly impossible to answer by studying these reclusive creatures in their wild habitat. Zoo staff collect urine and

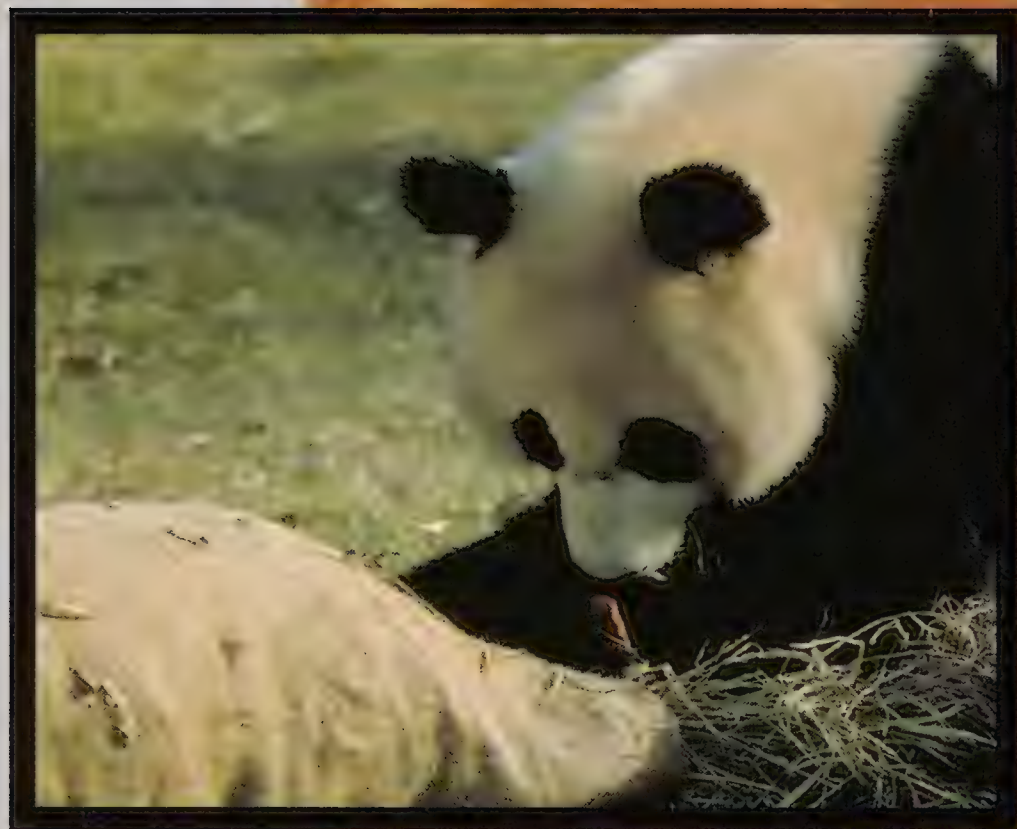
fecal samples each morning to analyze Mei's and Tian's reproductive and stress hormone levels—one reason why the two are kept separated at night. The volunteer Giant Panda Night Watch program is providing additional data on pandas' sleeping patterns, which can be compared with historic data gathered from Ling-Ling and Hsing-Hsing. The Zoo will also initiate research to test whether giant pandas instinctively react to the scent of potential predators like wolves and leopards.

Ultimately, the Zoo's Giant Panda Program is aimed at furthering giant panda conservation efforts in the wild. Zoo Director Lucy Spelman recently returned from China, where she again visited the Tangjiahe Reserve to chart the progress of the Zoo's financial support of this important reserve and to deliver lectures to Chinese reserve staff attending the National Zoo-led Wildlife Management and Conservation course. National Zoo visitors can feel encouraged that the delightful sight of Mei Xiang and Tian Tian wrestling in the grass, sleeping in a tree, munching on stalks of bamboo, or lounging in a cool grotto is, little by little, painting a picture of panda life that—along with

the \$10 million the National Zoo is furnishing the China Wildlife Conservation Association—will greatly assist the pair's wild cousins in central China.

The following photos paint their own portraits of Mei Xiang and Tian Tian during their inaugural year as Washington's premier panda couple. And this is only the beginning. *Z*





JESSIE COHEN/NZP



JESSIE COHEN/NZP

National Zoo staff are continually monitoring Mei Xiang's and Tian Tian's intake of various food items like leaf-eater biscuits, apples, carrots, and, of course, bamboo. A new project will examine their spatial orientation skills by hiding food in specially designed feeders.

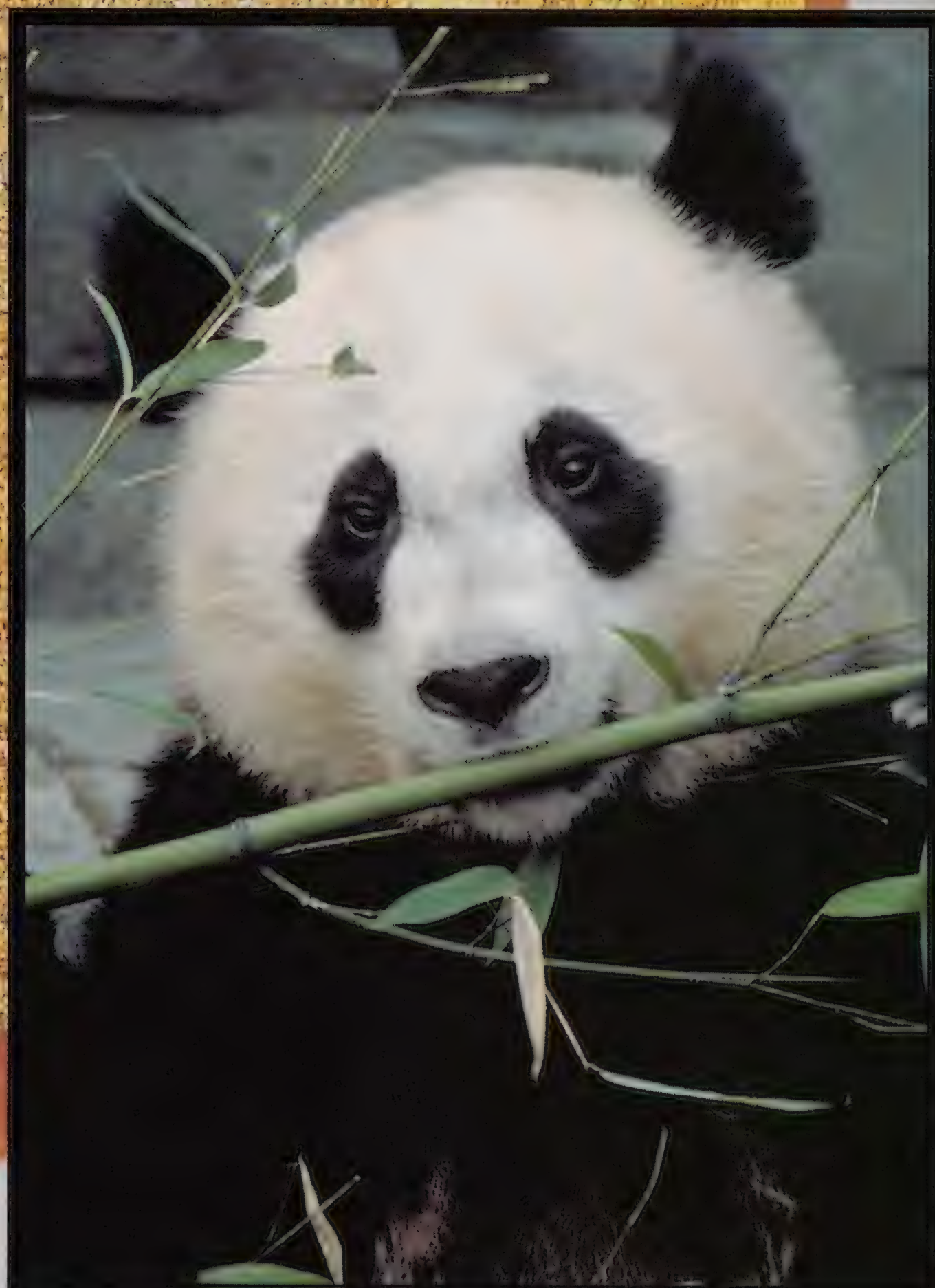
Staff have noticed that the two pandas have somewhat different preferences for bamboo species and even parts of the bamboo that they chow down first. Observing Mei's and Tian's enthusiasm for different types of bamboo will help scientists understand how giant pandas select bamboo in the wild.



ALEX HAWES



JESSIE COHEN/NZP



JESSIE COHEN/NZP

Zoo researchers and FONZ volunteers have collected hundreds of hours of observations of Mei Xiang and Tian Tian's social interactions. The two pandas are quite feisty, tumbling and wrestling with each other routinely each day. Staff have learned from previous experience with Ling-Ling and Hsing-Hsing that early socialization may help lay the foundation for future reproduction.



JESSIE COHEN/NZP



JESSIE COHEN/NZP



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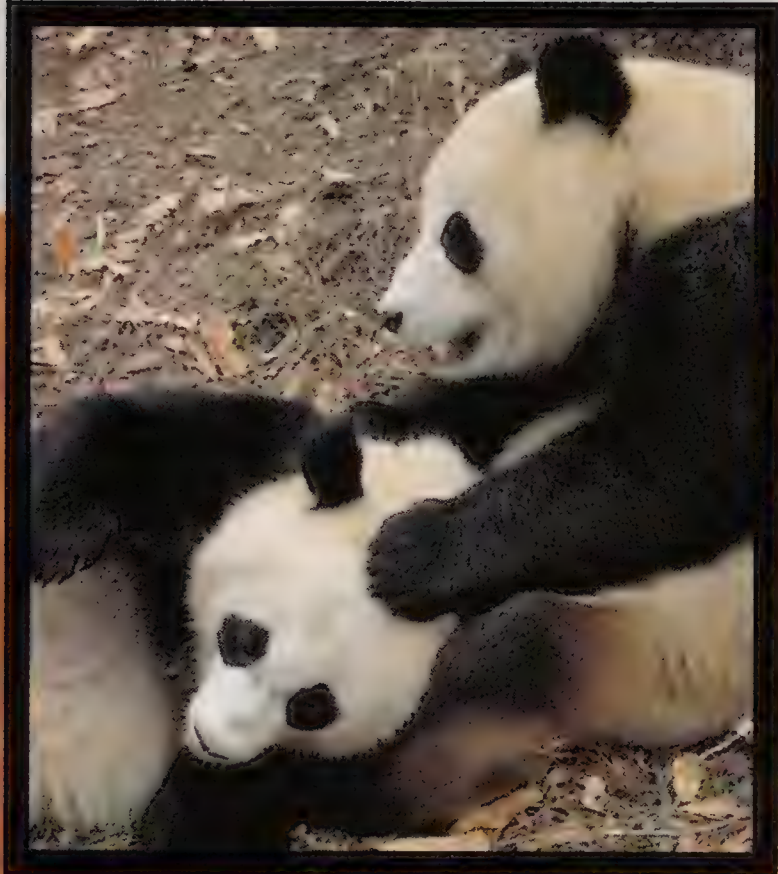
National Zoo keepers work closely with Mei Xiang and Tian Tian to train them for routine weigh-ins and health check-ups. Zoo veterinarians perform more extensive medical procedures during their annual physicals [left].



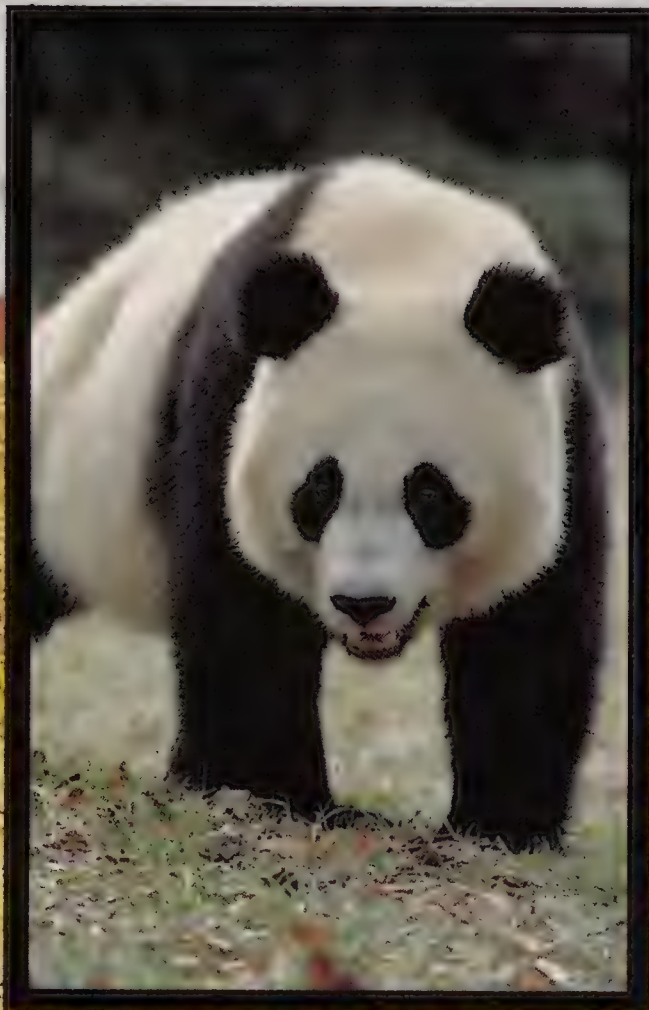
JESSIE COHEN/NZP



Mei and Tian enjoy not only social interaction with one another but cognitive stimulation from objects such as kongs [left], milk crates, items trickled with honey or other enticing scents, and tubs filled with bobbing apples.



JESSIE COHEN/NZP



JESSIE COHEN/NZP



JESSIE COHEN/NZP



JESSIE COHEN/NZP

Zoo staff are studying how Mei and Tian make use of their exhibit's mature climbing trees, new air- and water-cooled grottos, and wading pools in order to create the best environment for them in the future Fujifilm Giant Panda Conservation Habitat. So far, Mei appears to be the more enthusiastic tree climber, while both enjoy chilling in the pools during the summer.



JESSIE COHEN/NZP



JESSIE COHEN/NZP



ALEX HAWES



JESSIE COHEN/NZP



ALEX HAWES



JESSIE COHEN/NZP



ALEX HAWES



JESSIE COHEN/NZP

The Zoo's Giant Panda Program is shining a spotlight on the plight of wild pandas and other endangered species in China and around the world. Since Mei and Tian's public debut on January 10, 2001, these ambassadors for conservation have greeted nearly three million visitors—and tens of thousands more via the PandaCams on the Zoo's pandas.si.edu website. What's more, Zoo funds are helping to support giant panda reserves in China and to train Chinese biologists and conservationists.



JESSIE COHEN/NZP



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Pearls: A Natural History.

Neil H. Landman, Paula M. Mikkelsen,

Rüdiger Bieler, and Bennet Bronson.

2001. Harry Abrams, Inc., New York.

232 pp., hardbound. \$49.50.

One of the great challenges of wildlife conservation is persuading people that some odd species or another matters. Take mussels, for example. A shrug of indifference, or even a shudder of impatience, is a more likely response to the news that 16 species of mussels are on the U.S. Endangered Species List than is a shiver of alarm.

But what would have folks clamoring to save the mussels and oysters and abalones and other mollusks as well? *Pearls* might just do it. Among these lowly creatures are some that produce gemstones that people have prized for thousands of years. *Pearls: A Natural History* tells the story in rich detail and lustrous photographs; the book is as beautiful as its subject.

Pearls is not only about the biology of shelled invertebrates, as it encompasses the history, anthropology, and culture of pearls as well. Paleontologist Neil E. Landman and invertebrate zoologist Paula M. Mikkelsen (both of the American Museum of Natural History in New York) and zoologist Rüdiger Bieler and anthropologist Bennet Bronson (both of The Field Museum in Chicago) traveled the globe to learn about pearls, from their first appearance in the fossil record more than 200 million years ago to contemporary methods of periculture. Over and over I thought, "Wow, I didn't know that!" Or said to whomever would listen, "This is great. Did you know...?"

Women and men around the world have long adorned themselves with pearls, sometimes extravagantly, as paintings of such luminaries as Elizabeth I and other European Renaissance figures attest. In the 1880s, a strange group of Londoners, led by a street sweeper, began to cover their clothes—head to toe—with mother of pearl buttons. They called themselves the Pearlies, and they still exist in London in small numbers! Rich Indian women were described in the 1830s in these words: "Their heads look too large, from the quantity of pearls with which they load them." Strands of pearls also dangled from nose and ear rings.

Many legends surround pearls. One tells how Cleopatra wagered Marc Antony that she could offer him the most expensive meal ever prepared. He accepted the bet, then watched Cleopatra dissolve one of her pearl earrings in wine and drink it. He refused her offer of the other earring and, of course, lost the bet. The value of this pearl was reportedly worth 30 tons of gold.

Surprisingly, a pearl will dissolve in wine or vinegar, but only if it is first ground into a powder. Such dissolved pearls, or very small whole ones, were taken as medicine to treat a variety of ailments in Medieval and Renaissance Europe, and are still prescribed in traditional Asian medicine. Being mostly calcium, the authors point out, pearls couldn't hurt, and may even

help. A study of a medicinal mixture with calcium from the Akoya pearl oyster showed that it reduced cholesterol levels in rats.

The authors believe that one reason for pearls' perceived value is that they are the only gemstones produced by living animals. So what exactly is a pearl? Technically speaking, "... a pearl is a calcareous body, composed of concentric layers around a central nucleus, and organically produced by a living mollusk, a soft-shelled invertebrate animal bearing a hard external shell." The calcareous body is a form of calcium carbonate called nacre, interwoven with an organic membrane called conchiolin, and water.

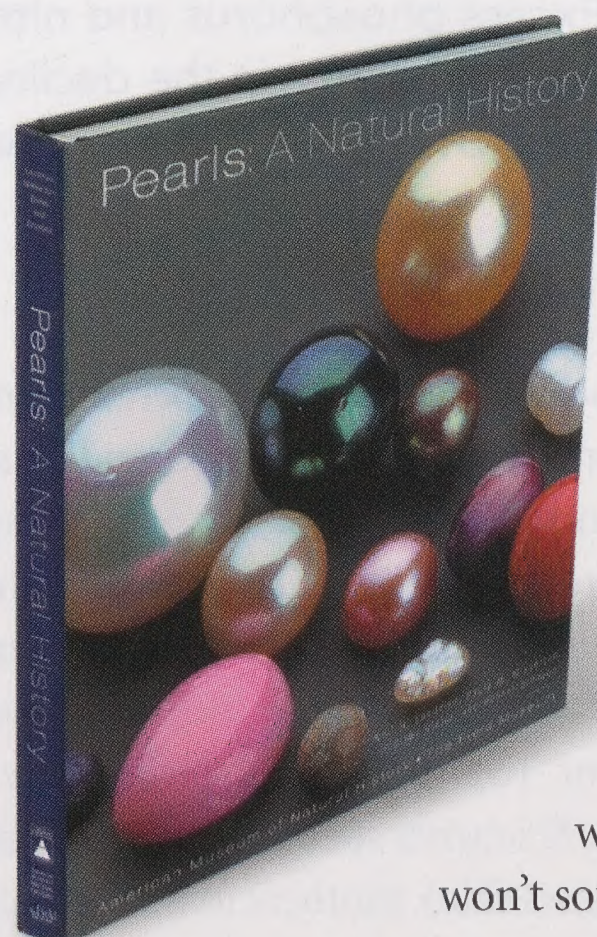
Not all mollusks produce pearls; neither are pearls exclusively the products of oysters. As noted above, some mussels make pearls, as do some conches, clams, and abalones. On the other hand, not all oysters make pearls; edible oysters do not, for instance, although people eating blue mussels sometimes crack a tooth on this species' small pearls. Nor are all pearls "pearly white." The color of a pearl matches that of the inside of the shell (which is also nacre and usually called mother of pearl) of the animal that produced it, and may be black, blue, pink, purple, or red.

Pearl formation begins when something irritates a mollusk's mantle, a tissue that secretes shell material. The shell material coats the irritant in thin layers. Contrary to popular belief, a grain of sand is only very rarely the stimulus, technically called the nucleus, for pearl formation. More usual stimuli are organic, such as parasites, small crabs, stray food particles, or even small fish. (Mechanical damage that moves mantle tissue to another part of the animal's body will also stimulate pearl development.) The shape of the nucleus then influences the shape of the pearl. Natural pearls are thus seldom perfectly round like the cultured pearls we see today. The nuclei of cultured pearls are usually tiny beads cut from the shells of mussels. These beads are normally inserted into domesticated oysters, and in a few years' time the oysters are harvested and the pearls extracted. In China, molds in the shape of Buddhas produce Buddha-shaped pearls for tourists and other trinket lovers.

Pearls concludes fittingly with a chapter entitled "Saving Pearls." Pearl-producing mollusks have been depleted by over harvesting many times and in many places around the world. While today's commercial pearls are cultured, millions of wild mussels are harvested for the mother of pearl used as nuclei. What's more, pollution, invasive species, and habitat loss adversely affect both wild and domesticated mollusks.

The authors do a wonderful job of mixing the more technical information with lighter stories, but all of the text is accessible, engaging, and lively. You can read *Pearls* straight through, or skip around, dipping into the captions, short features, and chapter subsections as something grabs your attention. In the end, though, I think most people will be drawn into reading every word of this fascinating book. And a plea to save mussels won't sound so silly anymore.

—Susan Lumpkin



GOOD NEWS

GOOD NEWS

Protected by both U.S. federal and international law since the mid-1960s, endangered blue whales (*Balaenoptera musculus*) may be slowly rebounding off the Pacific coast of California. John Calambokidis, a biologist with Cascadia Research, spotted more than 200 blue whales in a seven-square-mile zone near San Miguel, the farthest west of the Channel Islands, this past July. Numbering anywhere from 5,000 to 14,000 animals globally, blue whales range across much of the world's oceans. California's coastal waters alone contain 2,000 to 3,000 blue whales during the summer months, one of the densest concentrations of this species anywhere.

The largest creatures ever known to roam the planet, blue whales reach upwards of 190 tons in weight and 100 feet in length on a diet of krill and other tiny crustaceans. (A blue whale's tongue can alone weigh four tons.) An estimated population of more than 200,000 blue whales existed before 20th-century technological advances in whaling allowed hunters to track, kill, and process these massive mammals on factory boats in the open ocean.

It is too soon to tell whether the increased sightings of blue whales in California mirror healthier overall numbers for the species. Keep your fingers—or flippers—crossed!

BAD NEWS

BAD NEWS

The march to save the Chesapeake Bay is beating a retreat, according to the 2001 State of the Bay Report. Issued by the Chesapeake Bay Foundation (CBF), this annual report card tracking the Bay's environmental health gave the bay a 27 out of a possible 100 points, down from 28 points in 2000—the first decline in the four years since this reporting began. The figure combines 13 key indicators measuring the status of the estuary's habitat, pollution, and fisheries. A score of 100 represents the relatively pristine state of the Chesapeake before European settlement. According to CBF, a truly "saved" bay would warrant at least a 70-point score—indicating how much restoration work lies ahead.

Oysters (two points out of 100) and shad (six points) once again earned the lowest scores when measured against their historic populations. Blue crabs suffered the worst decline from the previous year, falling from 46 to 42 points. Both commercial and recreational crabbing, and the loss of critical underwater grass beds, have hammered the Chesapeake's legendary blue crab populations. Excess phosphorus and nitrogen—largely the result of agricultural runoff—appear the main culprits in the decline of the bay's water quality, while the loss of healthy habitat in the bay's watershed to sprawl have further eroded natural filtration systems.

—from www.cbf.org

SON IN THE SUN

Some lizard moms may influence the sex of their future offspring by soaking up the warm rays, according to biologists from the University of Sydney's Institute of Wildlife Research. Kylie Robert and Michael Thompson reported in the August 16 issue of the journal *Nature* that pregnant Australian water skinks (*Eulamprus tympanum*) whose body temperatures stayed above 77°F were more likely to give birth to males, while

those below this median temperature most often bore females. Temperature-dependent sex determination (TSD) is known to occur in egg-laying (oviparous) reptiles such as turtles and crocodiles, but the discovery of this phenomenon in Australian water skinks is the first known occurrence of TSD in a live-bearing (viviparous) species. Scientists speculate that thermoregulation allows skink mothers to manipulate skewed sex ratios in their population.

Australian water skinks inhabit alpine meadow and woodland ecosystems in southeastern Australia. Their unusual reproductive biology might prevent this species from occupying warmer lower elevations, where the skinks, in theory, would give birth exclusively to males. Moreover, global warming poses a serious threat to this and other temperature-sensitive species that lack access to cooler climes should their native habitat heat up.

WHAT'S IN A NAME?

Ursus arctos is the scientific name not for the Arctic-living polar bear (*Ursus maritimus*), but for the brown (or grizzly) bear. This designation is rather redundant, as *ursus* is the Latin word for "bear" and *arctos* comes from *arktos*, the Greek word for bear. The derivation of these twin terms, however, is a stellar story.

According to Greek myth, the god Zeus fell in love with and impregnated Callisto, a young attendant of Artemis (the goddess of the hunt). As punishment, Callisto was transformed by Hera or Artemis (depending on the version of the myth) into a bear, or by Zeus to evade Hera's notice. Zeus eventually summoned Callisto into the heavens to become the constellation Arktos, later known as Ursa Major in Latin. Callisto's son, Arcas, himself is said to have turned into the constellation Bootes, adjacent to his mother's domain, Ursa Major. Because of the position of these constellations in the northern skies, the word "Arctic" came to refer to the northern polar region. (Polaris, the North Star, itself is part of the Ursa Minor constellation.)

Alaska is the only U.S. state that boasts populations of both *Ursus arctos* and *Ursus maritimus*. Evoking the power of the bear, the Big Dipper—the brightest and most recognizable segment of Ursa Major—as well as Polaris appear on the Alaska state flag, which was designed by 13-year-old orphan John "Benny" Benson in 1927 (prior to statehood). It is not known whether Benson was an arctophile—a teddy bear collector.

—Alex Hawes



URSUS MARITIMUS.





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